MONITORING PLAN

PROJECT NO. C/S-21 LA. HIGHWAY 384 HYDROLOGIC RESTORATION

ORIGINAL DATE: December 11, 1996
REVISED DATE: July 23, 1998

Preface

Pursuant to a CWPPRA Task Force decision on April 14, 1998, the original monitoring plan was modified to conform with monitoring of projects of similar type. Specifically, submersed aquatic and emergent vegetation will be monitored every three years post-construction and water level and salinity will be monitored continuously through 2002. Upon collection and evaluation of the water level and salinity data set, the Technical Advisory Group (TAG) will determine if additional data collection is necessary. If additional monitoring is recommended, funds will be solicited.

Project Description

The La. Highway 384 Hydrologic Restoration project (State project No. C/S-21, CWPPRA project no. PC/S-25) is comprised of 1,125 ac (450 ha) of deteriorated wetlands located along the northeast shoreline of Calcasieu Lake in Cameron Parish (figure 1). The project area is bounded by Calcasieu Lake to the west, the Gulf Intracoastal Waterway (GIWW) to the east, and higher elevation prairie formations to the north and south.

The La. Highway 384 Hydrologic Restoration plan subdivides the project area (figure 1) into three Conservation Treatment Units (CTU's). CTU 1, which extends from Calcasieu Lake easterly to the La. Highway 384 embankment, includes 440 ac (176 ha) of open water and brackish marsh. Prairie formations form its northern and southern boundaries. CTU 2 includes 226 ac (90 ha) of open water and intermediate marsh. This unit extends easterly from the La. Highway 384 embankment. The northern boundary of CTU 2 is the prairie formation north of the project area, and its southwestern boundary is the prairie formation on which the community of Grand Lake is located. A continuous oil field road embankment joins the prairie formations north and south of the project area and forms the remainder of the southern and eastern boundaries of CTU 2. CTU 3 lies between CTU 2 and the GIWW and includes 459 ac (184 ha) of intermediate marsh.

Historically, the western portion of the project area was intermediate marsh with slightly brackish marsh immediately adjacent to Calcasieu Lake (U. S. Department of Agriculture, Natural Resources Conservation Service [USDA/NRCS] 1995, 1996a, 1996b). The eastern portion of the project area was fresh marsh up to the GIWW. In the late 1980's, Chabreck and Linscombe (1988) characterized the La. Highway 384 wetlands as brackish and intermediate. CTU 1 is currently classified as brackish marsh and is exposed to greater tidal energy than the other two units. CTU 2 and CTU 3 are currently classified as intermediate marsh, and are exposed to more stable water levels and lower salinity regimes than CTU 1.

Increased tidal volumes, enlargement of tidal exchange routes, and salt water intrusion resulting

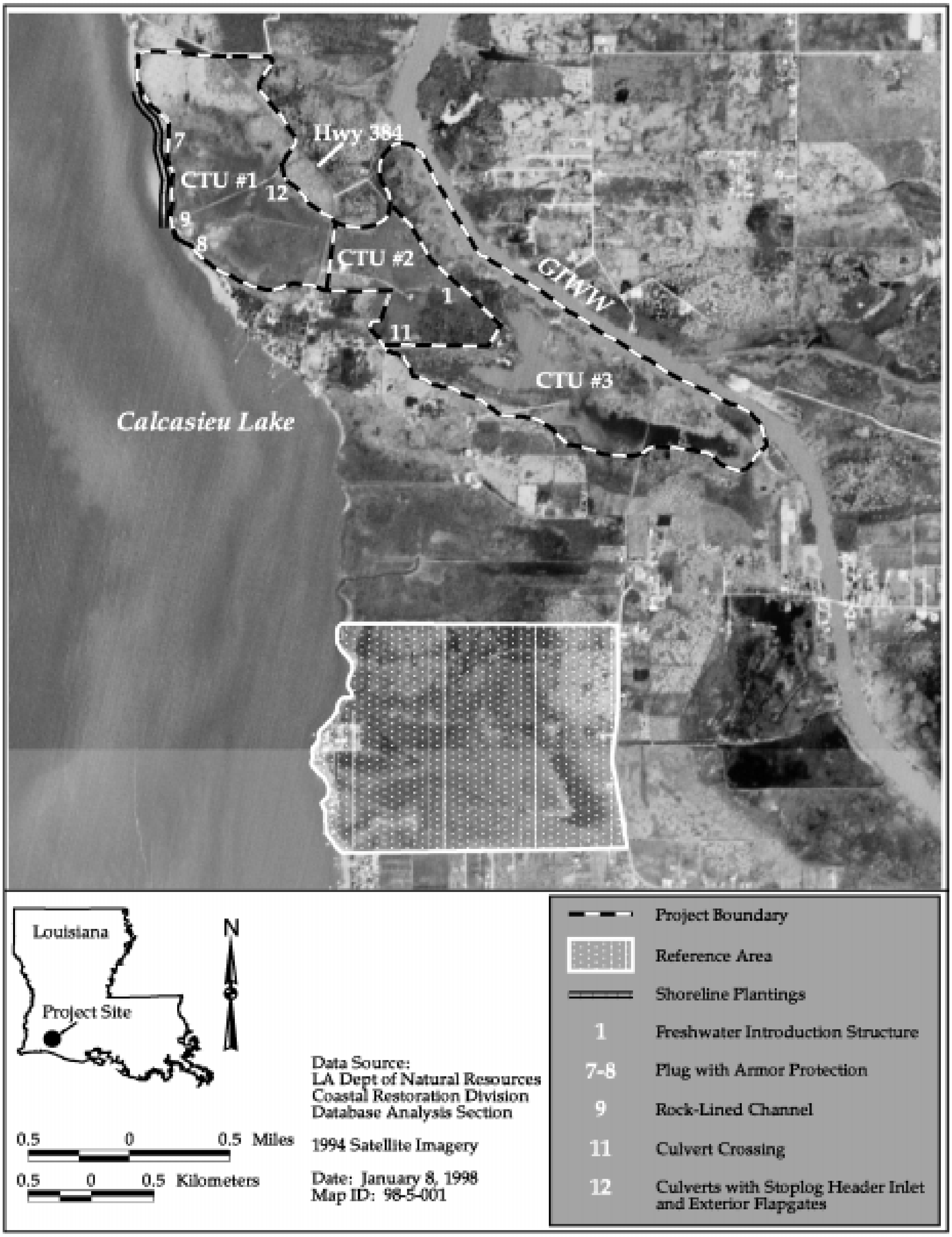

Figure 1. Louisiana Highway 384 Hydrologic Restoration (CS-21) project and reference area and locations of proposed project features.

from human-induced changes to the area's hydrology are the primary causes of wetland loss in the project area (Louisiana Coastal Wetlands Conservation and Restoration Task Force [LCWCRTF] 1993). The Calcasieu Ship Channel was constructed in 1941 and redredged to its current depth of 40 ft (12.2 m) and bottom width of 400 ft (122 m) in 1968 (Good et al. 1995). This channel radically altered the area's hydrology by increasing the height and duration of tidal fluctuations, which in turn increased water levels and saltwater intrusion into the low salinity marshes surrounding Calcasieu Lake (Suhayda et al. 1988). Spoil banks along the GIWW, which was constructed in the 1940's, have effectively blocked the project area's historical connection to the Mermentau River Basin, and now block off the major source of freshwater for the project area, the GIWW east of Calcasieu Lock. Construction of a drainage canal through the project area prior to 1940, and construction of an oil field road before 1963 both provided hydrologic exchange points connecting the fragile interior marsh soils of the project area to Calcasieu Lake (USDA/NRCS 1995, 1996a, 1996b).

Five soil types occur in the project area (U. S. Department of Agriculture, Soil Conservation Service [USDA/SCS] 1995). Gentilly muck, a poorly drained organic soil with an organic surface layer and an underlying alkaline layer, makes up 85% of the area. The remaining 15% consists of soils of the Mowata-Vidrine Series (6.3%) and Morey Series (4.6%) on the prairie formations, Aquents Series soils (3.6%) associated with spoil along canals, and Udifluvents Series soils (0.4%) that comprise the bulk of the spoil along the GIWW (USDA/NRCS 1995, 1996a, 1996b).

Hydrologic exchange between the project area and Calcasieu Lake allowed salt water to eradicate much of the non-salt tolerant emergent vegetation, exposing the fragile organic surface layer of the marsh soil to erosion and tidal scour. As a result, the organic surface layer has been largely transported out of the project area and into Calcasieu Lake. The loss in elevation of the soil surface provided by the organic surface layer of the soil has led to prolonged inundation of the emergent vegetation, which causes die-back of many wetland plant species (Mendelssohn and McKee 1988), and finally, the conversion of emergent marsh to open water (Gosselink et al. 1979).

Comparison of aerial photographs of the project area from 1940 to 1990 indicates that within this 50 yr period, 416 ac (166 ha) or 41% of the emergent marsh in the project area converted to open water (USDA/NRCS 1996a, 1996b) at an average rate of 8.3 ac/yr (3.3 ha/yr). In 1940, the ratio of emergent marsh to open water in the project area was 92:8. By 1990, the ratio was 51:49. The greatest loss occurred between 1953 and 1963 when 226 ac (90 ha) or 26% of the emergent marsh converted to open water. Shoreline erosion along Calcasieu Lake has also contributed to this loss of vegetated wetlands in the project area, as shown by analysis of aerial photographs of the adjacent lake shoreline from 1940 to 1990. Between 1963 and 1968, shoreline erosion averaged 18.48 ft/yr (5.63 m/yr). Between 1978 and 1990, shoreline erosion averaged 1.32 ft/yr 0.4 m yr) (USDA/NRCS 1996a, 1996b). Retreat along this shoreline alone results in the loss of 0.1 to 1.5 ac/yr (0.04 to 0.6 ha/yr). Wind-driven wave erosion of interior pond shorelines is also increasing the acreage of open water in the project area.

The La. Highway 384 project plan includes structural measures designed to improve hydrologic conditions within the project area and non-structural measures designed to provide shoreline protection and stabilization along the western project boundary. By reducing rapid water exchange and salinity, future conditions in the project area will resemble the low-energy conditions under which these marshes were formed. Protection of the shoreline along the western boundary will provide a stable buffer from wave action generated by predominantly southwesterly winds traversing the long fetch across Calcasieu Lake. Structural and non-structural measures planned and their intended functions are listed below, along with their respective Evaluation Site (ES) locations, which are identified on figure 1.

1. Set of 3 culverts, each with a manual sluice gate on the exterior and a flapgate on the interior to provide controlled freshwater introduction from the GIWW (CTU perimeter levee at ES No. 1).

2. Approximately 185 ft (56.4 m) of armored plugs to reduce hydrologic exchange with Calcasieu Lake and to decrease tidal scour and salinity in the project area (existing exchange points at ES Nos. 7 and 8).

3. Approximately 55 ft (16.8 m) of rock-lined channel section to prevent channel scouring due to increased flows anticipated as a result of plug installations at ES 7 and ES 8 (existing canal at ES No. 9 in CTU 1).

4. Set of 2 culverts, each with a variable-crested weir inlet and flapgated outlet to reduce and stabilize tidal ranges and salinity in project area south of the central shell road in CTU 1 (existing shell road at ES No. 12 in CTU 1).

5. Maintenance of approximately 10,000 ft (3 km) of existing road embankment to maintain the hydrologic barrier between CTU 2 and CTU 3 (existing embankment forming the southern and eastern perimeter of CTU 2).

6. Maintenance of 1 flow-through culvert to maintain an existing storm water drainage point for the adjacent prairie formation (existing perimeter embankment of CTU 2 at ES No. 11).

7. Approximately 2,000 ft (610 m) of vegetative plantings of smooth cordgrass to provide protection and stabilization and reduce shoreline erosion (Calcasieu Lake shoreline along west side of CTU 1). These plantings were installed in June 1995.

<u>Project Objectives</u>

1. Protect and maintain approximately 1,125 ac (450 ha) of intermediate to brackish wetlands by reducing water level variability, thereby increasing the abundance of emergent vegetation. This will be achieved through structural modification of hydrological conditions.

2. Preserve the existing hydrologic barrier between Calcasieu Lake and the interior marshes of the project area by maintaining the current position of, or by reducing the shoreline erosion rate along approximately 2,000 ft (610 m) of the lake shoreline using vegetative plantings and two canal plugs.

Specific Goals

The following measurable goals were established to evaluate project effectiveness:

1. Decrease the rate of marsh loss in the project area.

2. Reduce water level variability within the project area.

3. Maintain salinity levels within CTU 1 south of the central shell road at $\leq$ 10 ppt.

4. Maintain salinity levels in CTU 2 and CTU 3 within the 0–5 ppt target range for intermediate marsh vegetation.

5. Increase the coverage of emergent wetland vegetation and submersed aquatic vegetation (SAV) in shallow open water areas within the project area.

6. Reduce erosion rate on 2,000 ft (610 m) of shoreline along the western project boundary (Calcasieu Lake).

Reference Area

The importance of using appropriate reference areas cannot be overemphasized. Monitoring of both the project and reference areas provides a means to achieve statistically valid comparisons, and is therefore, the most effective way to evaluate project success. The main criteria for selecting reference areas are similarities in soil type, vegetation community, and hydrology to the project area.

The marsh east of Grand Lake Ridge, which is located 2 mi (3.2 km) south of the community of Grand Lake, was selected as the best reference area available for the La. Highway 384 project (figure 1). The predominant soil type in both the project and reference areas is Gentilly muck, with soils of the Mowata-Vidrine Series occurring on prairie formations in both areas (USDA/NRCS 1995, USDA/SCS 1995). The plant community in the project area and the proposed reference area consists mainly of *Juncus roemerianus* (black needlerush), *Spartina patens* (marshhay cordgrass), *S. alterniflora* (smooth cordgrass), and *Distichlis spicata* (salt grass). Like the La. Highway 384 project area, the Grand Lake Ridge area includes areas of historically low salinity marshes that have been degraded by human-induced hydrological changes. Both the project area and the reference area have experienced increased open water to emergent marsh ratios. Analysis of aerial photographs taken in 1940 shows an emergent marsh to open water ratio of 92:8 for the project area (USDA/NRCS

1995, 1996a, 1996b) and 85:15 for the reference area (USDA/SCS 1989). More recent aerial photography indicates that there was an emergent marsh to open water ratio of 59:41 for the project area in 1978 (USDA/NRCS 1995, 1996a, 1996b) and 20:80 for the reference area in 1980 (USDA/SCS 1989). Both areas have also experienced land loss due to wave erosion of the adjacent Calcasieu Lake shoreline.

Despite its greater land loss rate over the past 50 years, the marsh east of Grand Lake Ridge will serve as an adequate reference area for the La. Highway 384 project. This reference area will be monitored for marsh loss, water level, salinity, emergent vegetation, SAV, and erosion along the Calcasieu Lake shoreline for comparison with data collected on these parameters in the project area.

The main limitation with the selected reference area is that since it is a tidal, brackish system, it is comparable to CTU 1 and 2 of the project area, but not with CTU 3, which is an intermediate marsh area that is not regularly influenced by tides. Examination of recent aerial photography of the area and consultation with the USDA/NRCS District Conservationist in Lake Charles, Louisiana (Midkiff 1996) did not result in the location of a suitable reference area for CTU 3. However, in light of the restoration features planned and their projected benefits, the proposed project will have minimal influence on CTU 3, so the lack of a suitable reference area is not critical to project monitoring. Project implementation is expected to result in significant increases in the acreage of emergent vegetation and SAV in CTU's 1 and 2, where mean salinity and water level variability are expected to be reduced. The main benefit of project implementation on CTU 3 will be the maintenance of intermediate marsh conditions in that unit. In lieu of an intermediate marsh reference area for comparison with CTU 3, salinity, water level variability, emergent vegetation, and SAV data collected in CTU 3 will be analyzed for significant changes over time, using a paired t-test and/or ANOVA.

<u>Monitoring Elements</u>

The following monitoring elements will provide the information necessary to evaluate the specific goals listed above:

1. Habitat Mapping — To document land and water areas, marsh loss rates, and shoreline movement along Calcasieu Lake and ponded interior marsh areas in both the project and reference areas, near-vertical, color-infrared aerial photography (1:12,000 scale, with ground controls) will be obtained in 1997 prior to construction, and for post-construction years 2002 and 2011. The photography will be photointerpreted, scanned, mosaicked, georectified, and analyzed by National Wetlands Research Center (NWRC) personnel according to the standard operating procedure described in Steyer et al. (1995).

2. Water Level — To monitor hydrologic conditions within the project and reference areas, water level variability will be monitored at least monthly at

permanent discrete sampling stations within the project and reference areas, and by reading staff gauges installed inside and outside of the project area near existing/proposed water control structures. In addition, 4 continuous data recorders will be deployed, 1 in each project area CTU (3 total), and 1 in the reference area, to collect hourly water level data. To document the frequency, magnitude, and duration of head differences conducive to freshwater introduction into the project from the GIWW, the data recorders in CTU's 2 and 3 will be deployed near the freshwater introduction structure at ES 1, one on each side of the structure.

Upon collection of data (i.e., monthly readings from discrete stations and hourly readings from continuous data recorders) from 1997-2002, the Technical Advisory Group (TAG) will assist the Coastal Restoration Division (CRD) monitoring manager with evaluation of the data and determination of whether additional water level data collection is necessary. If additional monitoring is recommended, funds will be solicited.

Discrete and continuous data recorder stations may be added to or removed from the project and reference areas as data becomes available and a power analysis can be performed. Water level data will be used to document the variability in water level in the project and reference areas.

3. Salinity

Salinity will be monitored monthly at permanent discrete sampling stations within the project and reference areas. In addition, 4 continuous data recorders will be deployed to record salinity data, 1 in each project area CTU (3 total), and 1 in the reference area.

Upon collection of data (i.e., monthly readings from discrete stations and hourly readings from continuous data recorders) from 1997-2002, the TAG will assist the CRD monitoring manager with evaluation of the data and determination of whether additional water level data collection is necessary. If additional monitoring is recommended, funds will be solicited.

Discrete and continuous data recorder stations may be added or removed within the project and reference areas as data becomes available and a power analysis can be performed. Salinity data will be used to characterize the spatial variation in salinity throughout the project area, and to determine if project area salinity is being maintained within the target range.

4. Emergent Vegetation — To document the condition of the emergent vegetation in the project area over the life of the project, vegetation will be monitored at a maximum of 40 sampling stations established uniformly along transect lines across the wetlands in the project and reference areas. The number of sampling stations established in each project area CTU and in the reference area will be proportional to the acreage of each unit, with a minimum of 5 sampling stations per unit allowed. At each sampling station, percent cover, species composition, and dominant plant heights will be documented in a 2.0 m^2 sampling plot marked with 2 corner poles to allow for revisiting each site over time. Vegetation will be evaluated at the sampling sites once pre-construction in 1997, and in post-construction years 2002, 2005, 2008, 2011, 2014, and 2017.

5. Submersed Aquatic Vegetation — To document changes in the frequency of occurrence of SAV in the project area, SAV will be monitored using the rake method (Chabreck & Hoffpauir 1962, Nyman and Chabreck 1996). Within each study area (CTU 1, CTU 2, CTU 3, and the reference area), 2 ponds will be sampled for presence or absence of SAV at 25 random points within each pond. Species composition and frequency of occurrence (frequency = number of occurrences/25 x 100) will be determined. SAV will be monitored during the fall (October or November) once pre-construction in 1996, and in post-construction years 2002, 2005, 2008, 2011, 2014, and 2017.

6. Shoreline Change — To document changes in shoreline position, the color-infrared aerial photography taken for habitat mapping, will be digitized and analyzed to determine rates of change in shoreline position. Comparison will be made to historical data sets available in digitized format for the 1956, 1978, and 1988 aerial photography, and for subsequent years, as they become available. As a check on the accuracy of determining shoreline erosion rates through analysis of aerial photography, 5 shoreline markers will be installed at 500-ft (152 m) intervals on the vegetated edge along 2,000 ft (610 m) of the Calcasieu Lake shoreline of CTU 1 adjacent to the smooth cordgrass plantings. Five shoreline markers will be similarly established along the reference area shoreline. The shoreline markers will be monitored by taking direct measurements from each marker to the adjacent vegetated edge of the shoreline, once pre-construction in 1996, and in post-construction years 2002 and 2011, during the same year as, but prior to taking the color-infrared aerial photographs.

7. Soil Characteristics — To characterize soil conditions and document changes over time, soil samples will be collected from the sampling plots to be established in the project and reference areas to monitor emergent vegetation, and analyzed for bulk density, percent organic matter, and soil salinity. Soil condition will be monitored concurrently with the emergent vegetation, once pre-construction in 1997, and in post-construction years 2005 and 2014.

<u>Anticipated Statistical Analyses and Hypotheses</u>

The following hypotheses correspond with the monitoring elements and will be used to evaluate accomplishment of the project goals.

1. <u>Marsh loss/gain</u>. Descriptive and summary statistics on historical data (for 1956, 1978, 1988, and for any subsequent years) and data from aerial photography collected pre- and post-construction will be used, along with GIS interpretations of these data sets, to evaluate marsh to open water ratios and changes in the rate of marsh loss/gain in the project area. GIS interpretations of the aerial photography may also be used in the analyses of emergent vegetation and shoreline erosion.

   Goal: Decrease the rate of marsh loss in the project area.

2. <u>Water level variability</u>. The primary method of analysis for water level variability will be to determine differences in mean water levels as evaluated by an analysis of variance (ANOVA) that will consider both spatial and temporal variation and interaction. The ANOVA model used will be a BACI (Before–After–Control–Impact) type model, which will determine if there are detectable impacts in the project area after construction, (e.g., a decrease in water level variability). Multiple comparisons will be used to compare individual means across different treatment levels. All original data will be analyzed and transformed (if necessary) to meet the assumption of an ANOVA (e.g., normality). When the H_0 is not rejected, the possibility of negative effects will be examined. Two sets of hypotheses will be tested to determine if the following project goal has been met.

   Goal: Decrease the variability in water level within the project area.

   Hypothesis:

   H_0: Water level variability within the project area after construction at time point i will not be significantly lower than water level variability within the reference area after construction at time point i.

   H_a: Water level variability within the project area after construction at time point i will be significantly lower than water level variability within the reference area after construction at time point i.

Hypothesis:

H_0: Water level variability within the project area after construction at time point i will not be significantly lower than water level variability within the project area in previous years.

H_a: Water level variability within the project area after construction at time point i will be significantly lower than water level variability within the project area in previous years.

3. Salinity and salinity variability. The primary method of analysis for salinity and salinity variability will be to determine differences in mean salinities as evaluated by an ANOVA that will consider both spatial and temporal variation and interaction. The ANOVA model used will be a BACI type model, which will determine if there are detectable impacts in the project area after construction, (e.g., a decrease in salinity). Multiple comparisons will be used to compare individual means across different treatment levels. All original data will be analyzed and transformed (if necessary) to meet the assumption of ANOVA (e.g., normality). When the H_0 is not rejected, the possibility of negative effects will be examined. Two sets of hypotheses will be tested to determine if project goal 3c below has been met.

Goal: Maintain mean salinity within CTU 1 south of the central shell road at ≤10 ppt after construction.

Hypothesis:

H_0: Mean salinity within CTU 1 south of the central shell road will not be maintained at ≤ 10 ppt after construction at time point i.

H_a: Mean salinity within CTU 1 south of the shell road will be maintained at ≤ 10 ppt after construction at time point i.

Goal: Maintain mean salinity within CTU 2 and CTU 3 at ≤ 5 ppt after construction.

Hypothesis:

H_0: Mean salinities within CTU 2 and CTU 3 will not be maintained at ≤ 5 ppt after construction at time point i.

H_a: Mean salinities within CTU 2 and CTU 3 will be maintained at ≤ 5 ppt after construction at time point i.

Goal: Decrease the variability in salinity within the project area after construction.

Hypothesis:

H_0: Salinity variability within the project area after construction at time point i will not be significantly lower than salinity variability in the reference area after construction at time point i.

H_a: Salinity variability within the project area after construction at time point i will be significantly lower than salinity variability in the reference area after construction at time point i.

Hypothesis:

H_0: Salinity variability within the project area after construction at time point i will not be significantly lower than salinity variability in the project area in previous years.

H_a: Salinity variability within the project area after construction at time point i will be significantly lower than salinity variability in the project area in previous years.

4. Emergent vegetation. The primary method of analysis for emergent vegetation cover will be to determine differences in mean vegetation cover as evaluated by an ANOVA that will consider both spatial and temporal variation and interaction. The ANOVA model used will be a BACI type model, which will determine if there are detectable impacts in the project area after construction, (e.g., an increase in vegetation cover). A repeated measure design will be used in the ANOVA model. Multiple comparisons will be used to compare individual means across different treatment levels. All original data will be analyzed and transformed (if necessary) to meet the assumption of ANOVA (e.g., normality). When the H_0 is not rejected, the possibility of negative effects will be examined. Two sets of hypotheses will be tested to determine if the following project goal has been met.

Goal: Increase the occurrence (coverage) of emergent marsh vegetation in the project area after construction.

Hypothesis:

H_0: Occurrence of emergent marsh vegetation within the project area after construction at time point i will not be significantly greater than the occurrence of emergent marsh vegetation in the reference area after construction at time point i.

H_a: Occurrence of emergent marsh vegetation within the project area after construction at time point i will be significantly greater than the occurrence of emergent marsh vegetation in the reference area after construction at time point i.

Hypothesis:

H_0: Occurrence of emergent marsh vegetation within the project area after construction at time point i will not be significantly greater than the occurrence of emergent marsh vegetation in the project area in previous years.

H_a: Occurrence of emergent marsh vegetation within the project area after construction at time point i will be significantly greater than the occurrence of emergent marsh vegetation in the project area in previous years.

5. Submersed Aquatic Vegetation. Nonparametric tests will be used to compare the frequency of occurrence of SAV within a given sampling period and over all sampling dates. Within a given sampling period, the Wilcoxan–Mann–Whitney Test will be used to test the hypothesis that there is no difference in the mean frequency of SAV in the project area and the mean frequency of SAV in the reference area, after Siegel and Castellan (1988:128–37).

Over all sample dates, Repeated Measures Analyses will be used to compare the mean frequency of SAV between the project area and reference area (Steele and Torrie 1980:77–437). These data are likely to require transformation because percentage data with ranges between 0 and 20 or between 80 and 100 often follow the Poisson distribution (Steele and Torrie 1980:234–38). The square root plus 0.5 and the arcsin transformations are the most likely to correct heterogeneity of error associated with percentage data. Two sets of hypotheses will be tested to determine if the following project goal has been met.

Goal: Increase the mean frequency of occurrence of SAV.

Hypothesis:

H_0: Mean frequency of occurrence of SAV within the project area after construction at time point i will not be significantly greater than the mean frequency of occurrence of SAV in the reference area after construction at time point i.

H_a: Mean frequency of occurrence of SAV within the project area at any time point i will be significantly greater than the mean frequency of occurrence of SAV in the reference area after construction at time point i.

Hypothesis:

H_0: Mean frequency of occurrence of SAV within the project area after construction at time point i will not be significantly greater than the mean frequency of occurrence of SAV in the project area in previous years.

H_a: Mean frequency of occurrence of SAV within the project area after construction at time point i will be significantly greater than the mean frequency of occurrence of SAV in the project area in previous years.

6. Shoreline Change. Descriptive and summary statistics will be used to compare measured rates (in ft/yr) of shoreline movement along Calcasieu Lake adjacent to the project and reference areas between successive years. In addition, historical data sets will be used for statistical analyses of the long-term movement of the project area shoreline along Calcasieu Lake. Two sets of hypotheses will be tested to determine if the following project goal has been met.

Goal: Decrease the shoreline erosion rate along 2,000 ft (610 m) of Calcasieu Lake shoreline.

Hypothesis:

H_0: Shoreline retreat rate along the project area at time point i will not be significantly less than the shoreline retreat rate along the reference area at time point i.

H_a: Shoreline retreat rate along the project area at time point i will be significantly less than the shoreline retreat rate along the reference area at time point i.

Hypothesis:

H_0: Shoreline retreat rate along the project area at time point i will not be significantly less than the shoreline retreat rate along the project area in previous years.

H_a: Shoreline retreat rate along the project area at time point i will be significantly less than the shoreline retreat rate along the project area in previous years.

Notes

1.	Implementation:	Start Construction:	October 1, 1998
		End Construction:	March 1, 1999

2. NRCS Point of Contact: Loland Broussard (318) 896-8503
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3. DNR Project Manager: Garrett Broussard (318) 893-8763
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4. The twenty year monitoring plan development and implementation budget for this project is $394,931. Progress reports will be available in March 2000 and March 2001, and comprehensive reports will be available in March 2002, March 2006, March 2009, March 2012, March 2015 and March 2019. These reports will describe the status and effectiveness of the project.

5. The smooth cordgrass plantings proposed for this project were planted in June 1995 through the LDNR/NRCS/SWCC Vegetative Planting Program (LDNR Interagency Agreement No. 25030–95–18). The plantings were monitored under this program in August 1995, and they will be monitored again once in 1996, with future inspections possible, subject to time and manpower. Therefore, monitoring of the vegetative plantings will not be included in this monitoring plan.

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